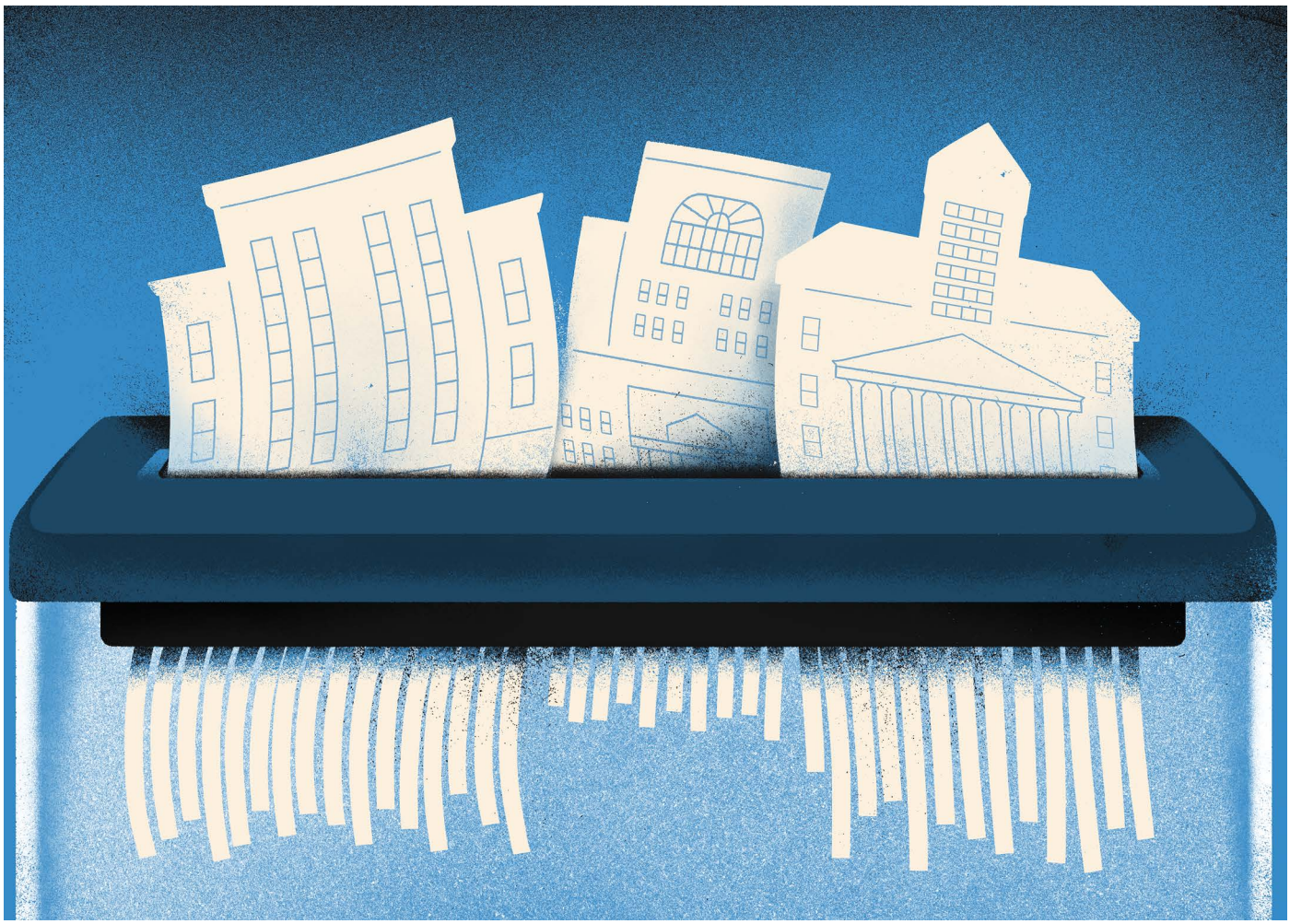


ILLUSTRATION: SÉBASTIEN THIBAULT

THESE UNIVERSITIES HAVE THE MOST RETRACTED SCIENTIFIC ARTICLES

A first-of-its-kind analysis by *Nature* reveals data on which institutions are retraction hotspots. **By Richard Van Noorden**

Two days before the end of 2021, administrators at Jining First People's Hospital in Shandong, China, issued a highly unusual report. The hospital announced that it had disciplined some 35 researchers who had been linked to fraud in publications, such as fabricating data. These sanctions were part of a countrywide crackdown motivated by concerns about a flood of sham medical papers emanating from hospitals.

The problem was that some young physicians at hospitals had purchased fake manuscripts from paper mills: companies that churn out fraudulent scientific reports to order. These doctors were under pressure because they were required to publish papers to get jobs or earn promotions, says integrity sleuth Elisabeth Bik in California. Sleuths such as Bik soon began spotting signs of this problem, identifying duplicated images in large numbers of papers. They publicized the issue and a wave of retractions followed.

This surge can now be seen in a first-of-its-kind analysis of institutional retraction rates around the globe over the past decade, for which *Nature*'s news team used figures supplied by three private research-integrity and analytics firms. Jining First People's Hospital tops the charts, with more than 5% of its total output from 2014 to 2024 retracted — more than 100 papers (see 'Highest retraction rates'). That proportion is an order of magnitude higher than China's retraction rate, and 50 times the global average. Depending on how one counts, the hospital could be the institution with the world's highest retraction rate.

Many other Chinese hospitals are retraction hotspots. But universities and institutes in China, Saudi Arabia, India, Pakistan and Ethiopia feature in the data as well (see 'Institutions with most retractions'). Retractions can be for honest mistakes and administrative errors, but evidence suggests the majority of cases in these data are related to misconduct.

This type of institution-level analysis has never been done before because it is particularly challenging: retractions data are messy,

there are errors in assigning author addresses to institutions, and creators of the underlying data sets make different choices about how to count institutions and published papers. So the results from the three independent analyses don't always agree, and should be seen as preliminary.

Despite those challenges, common trends emerge. They show that there is significant variation within countries: some institutions seem to be retraction hotspots, whereas others are relatively unscathed. In certain cases, that might just be because some institutions have evaded sleuths' attention, but it might also be related to specific research environments that seem to be associated with high proportions of erroneous or fraudulent work.

"It's tempting to think about whether differences are related to varying incentives for researchers in different institutions," says Ivan Oransky, co-founder of the website Retraction Watch, which maintains a public database of retractions on which the companies contacted by *Nature* partly depend.

Nature's analysis found that, for the majority of institutions with high retraction rates, retractions are spread across many authors. This hints at a problem with research-integrity culture rather than a few rogue researchers, says Dorothy Bishop, a retired neuropsychologist at the University of Oxford, UK, who investigates cases of research misconduct. This kind of analysis "could lead to some positive action" if institutions respond by examining what is leading to the patterns, she adds.

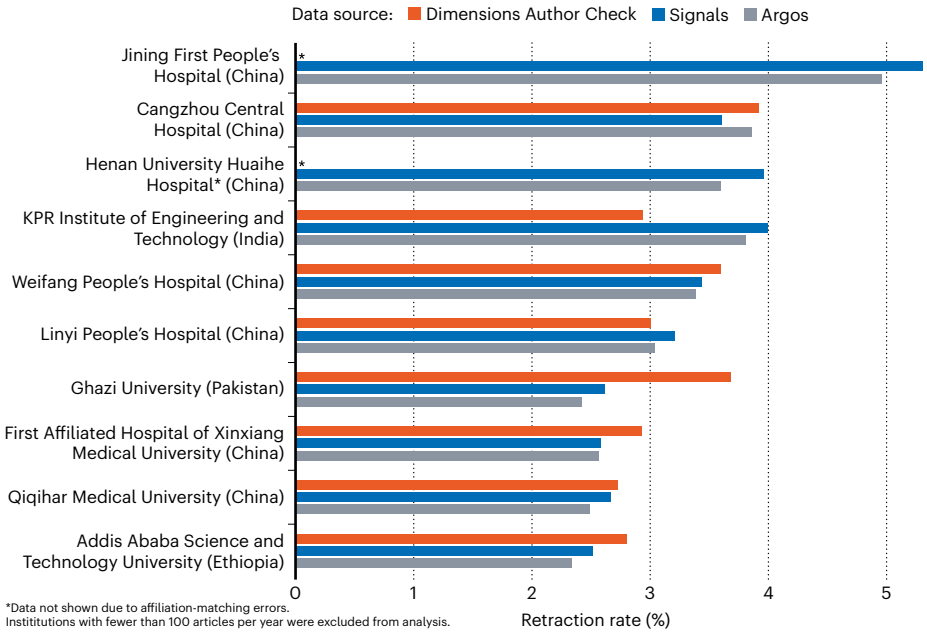
Integrity signals

The retraction data provided to *Nature* come from research-integrity tools that technology firms have launched over the past two years, which aim to help publishers stem a surge in fake and significantly flawed research. Among a flurry of these software products are Argos, from Scitility in Sparks, Nevada; Signals, from the firm Research Signals in London; and Dimensions Author Check, from the London-based company Digital Science. (The latter is part of Holtzbrinck, the majority shareholder in *Nature*'s publisher, Springer Nature. *Nature*'s news and features team is editorially independent of its publisher.) These three firms provided their institution-based retractions data to *Nature*; they also looked at countries and journals associated with retractions.

Their tools aim to alert users to potential 'red flags' in research articles or submitted manuscripts, such as authors who might have high numbers of misconduct-associated retractions. To build them, the firms have created internal data sets of retracted papers and their affiliations. These are largely based on Retraction Watch's database; launched in 2018, it was acquired in 2023 for public distribution by Crossref, a US non-profit organization that indexes publishing data. This made it easier for others to use and analyse the information.

HIGHEST RETRACTION RATES

These institutions have had the greatest proportion of research articles retracted from their total output in 2014–24, according to analyses by three firms that have developed tools to study retractions data.



*Data not shown due to affiliation-matching errors.
Institutions with fewer than 100 articles per year were excluded from analysis.

SOURCE: *NATURE* ANALYSIS

The firms *Nature* contacted have built on this data set by omitting retracted articles that lack DOIs (digital object identifiers) and adding retraction information gleaned from other online sources, such as CrossRef, the life-sciences index PubMed and journal websites. The companies shared their internal work on the condition that their data sets would not be published in full, in part because they use them for the software tools that they sell to scientific publishers and institutions.

One firm, Scitility, says it will make its institution-level figures public later this year. "We think scientific publishing will be helped if we create transparency around this," says the firm's co-founder Jan-Erik de Boer, a former chief information officer at Springer Nature who is based in Roosendaal, the Netherlands.

The three firms' numbers of retracted articles are some 6–15% greater (over the past decade) than the Retraction Watch data set they build on. But in some cases, articles can be recorded erroneously in CrossRef and other online sources[1], so the data might not be 100% accurate, cautions Jodi Schneider, an information-sciences researcher at the University of Illinois Urbana-Champaign who studies retractions.

Retraction Watch staff have also manually filled in the reasons — as far as they can determine them — for each recorded retraction, indicating that the majority are due to misconduct. Those data aren't available for the records that the firms have added.

Retraction patterns

Data on retractions show that they are rare events. Out of 50 million or more articles published over the past decade, for instance, a mere 40,000 or so (fewer than 0.1%) have been retracted, according to the firms' data sets. But the rise in retraction notices (by which journals announce that a paper is being retracted) is outstripping the growth of published papers — partly because of the rise of paper mills and the growing number of sleuths who spot problems with published articles.

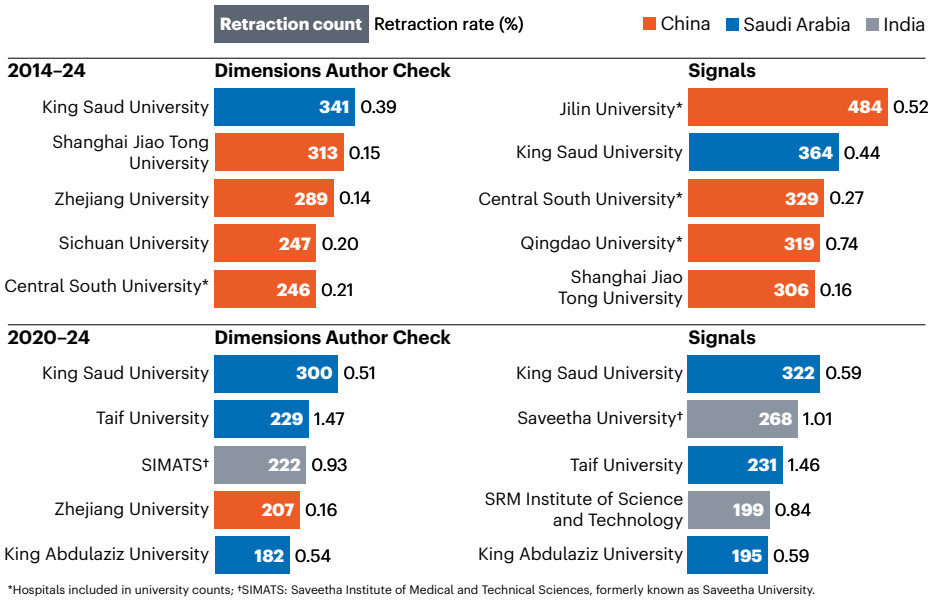
In 2023, as *Nature* reported, more than 10,000 retraction notices were issued (*Nature* **624**, 479–481; 2023). Most of these were from Hindawi, a now-closed London subsidiary of the publisher Wiley, which found that Hindawi journals were affected by a blizzard of peer-review fraud and sham papers. (Wiley told *Nature* at the time that it had scaled up its research-integrity teams, put in place more rigorous processes to oversee manuscripts and removed "hundreds" of bad actors, including some guest editors, from its systems). During the past decade, the annual retraction rate — the proportion of published articles in a particular year that have been retracted — has trebled (although fewer retraction notices were issued overall in 2024 than in 2022 or 2023). The proportion reached around 0.2% for papers published in 2022, and will rise as more articles are withdrawn.

Over 2014–24, almost 60% of retracted articles (more than 20,000 of them) have authors with affiliations in China. Overall, about 0.3% of that country's articles have been retracted so far — three times the global average.

But this is surpassed by retraction rates in Ethiopia and Saudi Arabia, and exceeded or rivalled (depending on the data set) by those in Iraq and Pakistan. (In the Retraction Watch data, Russia also rivals Iraq's rates, but because many Russian retractions don't have DOIs and aren't in global databases, the firms omitted

INSTITUTIONS WITH MOST RETRACTIONS

Chinese universities top the lists of institutions with most retracted articles from 2014 to 2024. But those in Saudi Arabia and India take the lead for retractions in the past half-decade. (See go.nature.com/4teshpv for more data.)



*Hospitals included in university counts; †SIMATS: Saveetha Institute of Medical and Technical Sciences, formerly known as Saveetha University.

SOURCE: *NATURE* ANALYSIS

them from their analyses.) Meanwhile, countries such as the United States and the United Kingdom have rates of around 0.04%, much lower than the global average of 0.1%, and many countries have even lower rates.

The rates quoted depend on how analysts count a country's overall number of research articles: the denominator. For instance, Signals and Argos use data from OpenAlex, a public bibliometric database, to tally published articles. But this data set's coverage is generally larger than that of the Dimensions database, which Digital Science curates. Therefore, retraction rates are typically lower in the data from Signals and Argos.

Institutional hotspots

Analysing institutions is an even thornier task, because there are both data errors and different approaches in the underlying databases, *Nature*'s analysis found. To map institutional affiliations, Dimensions uses a private Global Research Identifier Database (GRID), whereas OpenAlex uses the public Research Organization Registry (ROR). Both contain quirks – affiliations can be missing or wrongly attributed (a particular issue for some smaller institutes) or the database curators might simply have made different choices about how to assign an affiliation. Accordingly, the firms' analyses vary.

Still, a general picture emerges of an institutional retraction-rate leader board that is dominated by small Chinese hospitals and medical universities. In the Dimensions data set, over 2014–24, around 70% of the 136 institutions with a retraction rate above 1% are from China, and about 60% of those are hospitals or medical universities. The Argos data set, with 186 institutions with rates above 1%, gives a similar split. Signals shared only its top-ten lists, again dominated by Chinese institutions. (*Nature* reached out to all of the institutions mentioned in this article for comment, and did not hear back before publication.)

China's science ministry and other government bodies have tried to crack down on fraud and perverse publishing incentives. In guidelines issued in 2020 and 2021, they emphasized that "research publications should not be a mandatory requirement for professional advancement," says Shaoxiong Brian Xu at Huanggang Normal University in China, who studies retraction notices. The government agencies have also announced other sweeping investigations into research fraud. But, as Xu points out in an analysis published this January, China's annual retraction rates have risen[2]. (Jining First People's Hospital, however, has seen only three retractions of papers published in 2022, and none since.)

Outside China, institutions that are notably high up on several leader boards include Ghazi University in Dera Ghazi Khan, Pakistan; Addis Ababa Science and Technology University in Ethiopia; and India's KPR Institute of Engineering and Technology in Coimbatore. In KPR's case, according to the Retraction Watch data set, almost all of the retractions relate to a decision by IOP Publishing (the publishing arm of the UK Institute of Physics), which in 2022 retracted 350 papers from 2 volumes of conference proceedings released the year before. The publisher cited misconduct as the reason, including "systematic manipulation of the publication process and considerable citation manipulation". More than 100 of those papers had authors who were affiliated with KPR.

To avoid counting the smallest institutes, for which high rates reflect just a few retractions, *Nature* filtered out universities that produce fewer than 100 articles a year. This means, for instance, that Showa University Hospital in Tokyo – where the work of one researcher generated 124 retractions – is excluded from the list; otherwise, it would have notched up a retraction rate of almost 10%.

Still, the universities that top the lists tend to be relatively small. In Ghazi University's case, around half of its total retracted papers are by just four authors.

Some sleuths have speculated that authors from Ethiopia and some other African countries that publish relatively few articles might sometimes have been added to paper-mill products that originated elsewhere, to take advantage of Hindawi's waived open-access fee for scholars from low- or lower-middle-income countries. A spokesperson for Wiley (the owner of Hindawi) did not give details, but commented: "We are aware of authorship for sale and waiver manipulation schemes deployed by paper mills," adding that the publisher has strengthened its internal checks.

Most retractions

A different way to view the data is to pick out institutions with the largest overall numbers of retractions. Most are Chinese universities, but King Saud University in Riyadh, Saudi Arabia, makes the top three. The institutions with the largest number of retracted papers tend not to have the highest retraction rates, because they are large and so publish a lot. The lists of highest-overall retractions also differ because for some Chinese universities – such as Jilin University – some analysts counted retractions from hospitals associated with the university, too.

One clear change on which all the analyses agree is that in the past half-decade, retractions from institutions in Saudi Arabia and India have come to the fore – largely because of paper-mill activity from Hindawi journals.

Another way to examine the overall data is though scatter charts, which highlight that there is significant variation within countries. These show, for instance, that Chinese universities tend to have a lower retraction rate than do Chinese hospitals (see 'Retractions across research institutions').

In India, it's notable that the institutes with the highest retraction rates are almost all private colleges and institutes in the state of Tamil Nadu, an education hub, says Achal Agrawal, a freelance data scientist in Raipur. That accords with his own analyses of retractions in India, which he has been posting online over the past year after founding India Research Watch (IRW), an online group of researchers and students that is trying to highlight plagiarism and other publication misconduct in the country. Working with IRW, Agrawal has also created a dashboard to visualize Retraction Watch's data for other countries.

Researchers in public universities and government institutes in India face fewer pressures to publish than do those in private universities and colleges, says Agrawal. Private institutions, he says, push students and researchers to publish many articles, and in some cases pay bonuses for papers published.

In recent years, some private institutes have climbed national rankings of research standings by massively expanding their publication and citation records — but they also have high retraction numbers and rates. "I think we need to push for retractions to be taken into account for rankings," Agrawal says. "It's the only language that the institutes understand."

In a preprint he posted this January, Agrawal suggested that country-level data from around the world show that pressure to publish is connected to higher retraction rates[3].

He examined 25 countries in the Retraction Watch database, and chose a measure that might be termed a retraction-notice rate — the number of retraction notices issued in 2022–24, divided by the volume of a country's research articles in the past half-decade.

He showed a correlation between countries that heavily increased their volume of articles in the past five years (led by Ethiopia and Saudi Arabia) and subsequent retraction-notice rates. "This calls into question the current incentive system which promotes quantity over quality," he wrote.

But with retractions being rare events, there might be an attention-bias effect, he cautions. Sleuths who spot errors or misconduct in a particular set of works might focus more heavily on the sources of those problems, so that the more retractions an author or institute accumulates, the more they're scrutinized.

Hardest-hit journals and fields

Nature also examined the journals that have the highest retraction rates. (Scitility's Argos tool makes these figures public to anyone with a free account, although users must subscribe to dig into the details.) Unsurprisingly, Hindawi journals feature highly, with 4 having retracted more than 20% of the articles they have published since 2014. Another 4 titles retracted more than 10%, according to Argos's analysis.

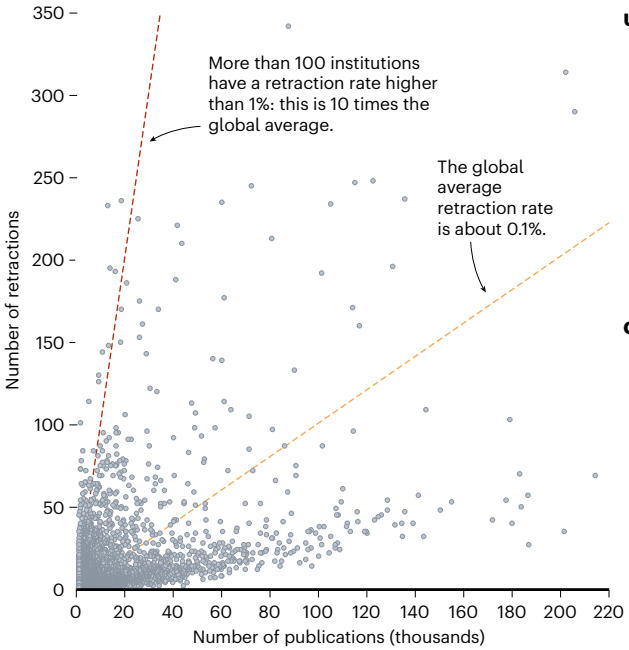
Argos and Dimensions also shared data on the research-topic areas that they associate with high retraction rates. 'Business and International Management', 'Computer Graphics and Computer-Aided Design' and 'Cancer Research' (all with rates of more than 0.5%) were Argos's top three; Dimensions, using a different topic-analysis classification, picked out 'Distributed Computing and Systems Software', 'Biomedical Engineering' and 'Cybersecurity and Privacy'.

If all fraudulent or sloppy work were retracted, analyses suggest that hundreds of thousands of papers should be pulled[4].

SOURCE: *NATURE* ANALYSIS

RETRACTIONS ACROSS RESEARCH INSTITUTIONS

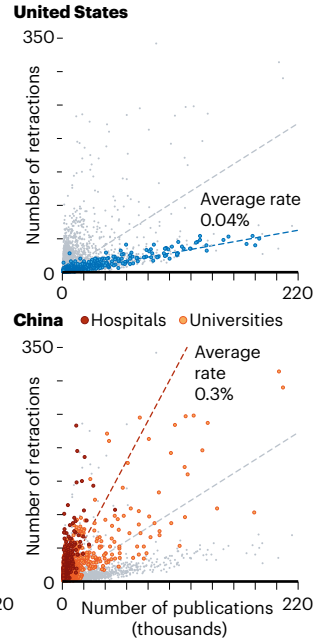
Each dot represents an individual institution worldwide, showing its publication volume and number of retracted articles in 2014–24*. Dots lying on a steeper gradient have a higher retraction rate.



*Data from Dimensions Author Check, filtered to remove institutions with fewer than 100 articles per year.

Retractions within countries

Highlighting specific countries reveals variation, with some types of institution within those nations having higher retraction rates than others.



Accordingly, many sleuths say retraction rates should be an order of magnitude higher at least. And they caveat that current retractions hotspots are partly a result of the research community's attention and of publishers' willingness to clean up their journals, rather than an absolute indication of the countries, fields or institutions associated with low-quality work. Retractions are "a proxy for attention", says Oransky.

For instance, anaesthesiologists feature heavily in a Retraction Watch list of individuals who have the greatest number of retractions. But the high rate for anaesthesiology is caused by the scrutiny of journal editors and researchers in that community, who recognized early on that there were problems in their field and pushed for investigations.

Guillaume Cabanac, a computer scientist at the University of Toulouse in France who detects problem papers, notes that some fields or institutions that have low retraction rates might have achieved this merely by avoiding investigating problems.

And Adam Day, the founder of Clear Skies, a London-based research-integrity firm, says it's hard to put into context what institutional leader boards for retractions actually mean. This is because of data-quality issues and because it is debatable how responsible institutions are for the bad behaviour that gets detected, particularly in cases in which affiliations are faked (some authors have found their names and affiliations added to papers they had nothing to do with, as Retraction Watch has reported; see go.nature.com/40upzad). "It's largely paper-mill activity," Day says, "so it's probably not a bad thing to shine a light on it".

Day's company (and others, including Digital Science) concentrate on mapping authorship networks as a way to find other probable paper mills[5]. One signal is when authors from multiple disparate nations publish together but don't seem to otherwise collaborate or share research interests.

But despite the messy nature of retractions data, and the caveat that they can't be taken as an absolute measure of poor quality — because of the huge number of papers that could be pulled but haven't been — it's still useful to examine retractions and rates for institutions, says Schneider.

Just as citation metrics are equated with quality, any counter-metric that helps institutions to prioritize ways to improve their processes and incentives is worthy of attention. "A lot of the problems with the publish-and-perish world are ratcheted up by institutional incentives," she says.

Richard Van Noorden is a features editor for *Nature* in London.

1. Schneider, J., Lee, J., Zheng, H. & Oyewale Salami, M. in *Proc. 27th Int. Conf. Sci. Technol. Innov. Indic.* https://doi.org/10.55835/6441e5cae04dbe5586d06a5f (2023).
2. Xu, S. B. & Hu, G. *Nature Hum. Behav.* https://doi.org/10.1038/s41562-024-02099-w (2025).
3. Agrawal, A. Preprint at Zenodo https://doi.org/10.5281/zenodo.14634333 (2025).
4. Heathers, J. Preprint at OSF https://doi.org/10.17605/osf.io/5rf2m (2024).
5. Porter, S. J. & McIntosh, L. D. Preprint at arXiv https://doi.org/10.48550/arXiv.2401.04022 (2024).

Correction

The main text of this News feature named the wrong Ethiopian university in its examples of institutions that are high up on several leader boards.

Corrected 27 February 2025